Appendix F

Data Sources and Data Quality Screening

Water quality data were compiled as input sources for near- and far-field water quality impacts analyses using the dynamic modeling techniques described in Section 5 of the antidegradation analysis. Compiled ambient water quality data were also used to perform a trend analysis of historic water quality data in the lower Sacramento River and Delta. A detailed description of the regional surface waters trend analysis is included in Appendix G. All effluent and ambient water quality data were evaluated by a data screening process prior to use in the antidegradation analysis.

DATA SOURCES

The sources of the water quality concentration data and flow data used for water quality modeling and trend analysis are shown in **Table 1**.

DATA QUALITY SCREENING

Data from the various water quality monitoring programs shown in **Table 1** were selected for the antidegradation analysis because they meet the qualitative objectives of comparability and representativeness. Comparability of data can be defined as the similarity of data generated by different monitoring programs. This objective is evaluated primarily by comparing the sampling methods and analytical procedures used among various monitoring programs. Comparisons of data sets collected by the monitoring programs list in **Table 1** for a certain parameter at or near a particular location during a specific time period reveal a considerable degree of comparability. Representativeness of data can be defined as the degree to which the environmental data generated by a monitoring program accurately and precisely represent actual environmental conditions. This objective is addressed by the overall design of the monitoring program. Specifically, representativeness is evaluated by the selection of appropriate locations, times, frequencies of sampling, methods, and detection limits for each environmental parameter measured by a monitoring program, as well as the maintenance of the integrity of a sample after its collection, and its overall evaluation by a rigorous QA/QC program. Finally, data were selected for near- and far-field water quality impact assessments that possess detection limits that are sufficiently low to allow for comparison to relevant water quality objectives.

Dynamic Model Input Data Quality Screening

The effluent and upstream ambient water quality data used as inputs to the dynamic model were collected by the SRCSD, either through NPDES effluent monitoring or via the Sacramento Coordinated Monitoring Program (CMP) which collects water quality samples at the Sacramento River at Freeport. Effluent NPDES water quality data were reviewed by Larry Walker Associates (LWA) and SRCSD prior to use for unit errors, duplicate records, and decimal slippage. Upstream ambient water quality data collected in the Sacramento River at Freeport were also reviewed for duplicate records, unit consistency, and uncharacteristic results. **Table 2** shows a list of data quality screening notes for each ambient data set compiled for statistical calculations and use as input to the dynamic model.

Table 1: Data Sources used in Water Quality Modeling and Surface Waters Trend Analysis.

Category	Data Source	Analysis
SRCSD Program and Affiliated[1] Program Sources		
	Sacramento Coordinated Monitoring Program (CMP)[1]	Dynamic Modeling &Trend Analysis
	Additional SRCSD receiving water monitoring	Trend Analysis
	13267 monitoring	Trend Analysis
	Pretreatment Pollution Prevention Program monitoring (P4)	Trend Analysis
	Sacramento River Watershed Project (SRWP)[1]	Dynamic Modeling &Trend Analysis
Online Publicly Available Data Sources		
	United States Geological Survey National Water Information System II Web Interface (USGS)	Dynamic Modeling & Trend Analysis
	Water quality data for California	
	Surface water daily data for California	
	California Department of Water Resources Municipal Water Quality Investigations Program Water Data Laboratory (MWQI)	Dynamic Modeling & Trend Analysis
	Water quality data	
	Field data	
Pre-compiled from Publicly Available Sources		
	Central Valley Drinking Water Policy Work Group Database (CVDWPWG)	Dynamic Modeling & Trend Analysis
	USGS water quality data for California	
	CMP	
	MWQI	
	California Department of Water Resources - Environmental Water Quality and Estuarine Studies Branch	
	California Department of Water Resources - Environmental Monitoring Program (EMP)	
	SRWP	
	California Department of Water Resources - Northern District	
	Drinking Water Program Conceptual Models Database (DWP)	Dynamic Modeling & Trend Analysis
	USGS water quality data for California	
	CMP	
	MWQI	
	California Department of Water Resources - Environmental Water Quality and Estuarine Studies Branch	
	EMP	
	SRWP	
	Interagency Ecological Program Data Vaults (IEP)	
	US Fish and Wildlife Services and UC Davis Nutrient Study	
Other Sources		
	US Fish and Wildlife Services and UC Davis Nutrient Study	Dynamic Modeling & Trend Analysis

Table 2: Sacramento River at Freeport Ambient Water Quality Data Sources used for Dynamic Model Input with Associated Data Quality Screening Notes.

Data Source	Screening Notes
Sacramento Coordinated Monitoring Program (CMP)	Adjusted for unit consistency; few minor errors and duplicates
SRWTP additional receiving water monitoring	No errors found
SRWTP 13267 monitoring	Effluent data removed
SRWTP Pretreatment Pollution Prevention Program monitoring (P4)	Potential duplication with 13267 data resolved
Sacramento River Watershed Project (SRWP)	No errors found
United States Geological Survey National Water Information System II Web Interface (USGS)	No errors found

Ambient Data Quality Screening for Far-Field Impacts Assessment and Trend Analysis

Ambient water quality data used in far-field water quality impacts assessments and trend analyses were reviewed prior to their use in the antidegradation analysis. Duplicate results found in overlapping data sources were removed. For example, in cases where USGS data were downloaded from the NWIS website and also received as part of a pre-compiled data set, such as the Central Valley Drinking Water Policy Work Group Database, duplicate records were removed. Occasionally, discrepancies were observed between results from an original data source and a pre-compiled data set. In these cases, data from the original data source were used in the analysis and data from the pre-compiled data set were deleted from the data set. Duplicate results within a single data source were also removed, after the data point was verified as a true duplicate by identically matching all information contained in its alleged replicate record. Duplicated results stemming from the reporting of an analyte measured by more than one analytical method were reviewed, and those results providing no additional useful information were removed. For example, where two analytical methods each reported a non-detected result for the same sample at different detection limits, the result with the higher detection limit was removed from the data set prior to data analysis.

The data were reviewed for inconsistencies such as unit errors or decimal slippage, and verified against original data sources where possible. Where verification was inconclusive or unsatisfactory, the dubious data were removed from the data set (e.g., in the case of an impossible pH result of 21 standard units reported by the original data source with the qualification, “The data you have secured may include data that have not received Director's approval and as such are provisional and subject to revision”.).

Additionally, ammonia data reported as NH_3, nitrate data reported as NO_3, and nitrite data reported as NO_2 were converted to “as nitrogen” concentrations (mg/L as N). **Table 3** shows the data quality screening notes generated for each data set used in the surface water trend analysis, which included the Sacramento River at Freeport data set also used as input to the dynamic model.

Table 3: Ambient Water Quality Data Sources used in Water Quality Modeling and Surface Waters Trend Analysis with Associated Data Quality Screening Notes.

Category	Data Source	Screening Notes
SRCSD Program and Affiliated[(1)] Program Sources		
	Sacramento Coordinated Monitoring Program (CMP)[(1)]	Adjusted for unit consistency; few minor errors and duplicates
	Additional receiving water monitoring	No errors found
	13267 monitoring	Few consistency issues and effluent/ambient data mix-ups
	Pretreatment Pollution Prevention Program monitoring (P4)	Few consistency issues
	Sacramento River Watershed Project (SRWP)[(1)]	No errors found
Online Publicly Available Sources		
	United States Geological Survey National Water Information System II Web Interface (USGS)	High early detection limits for metals
	California Department of Water Resources Municipal Water Quality Investigations Program Water Data Laboratory (MWQI)	Few duplicates
Pre-compiled from Publicly Available Sources		
	Central Valley Drinking Water Policy Work Group Database (CVDWPWG)	Significant units errors, unrealistic outliers, detection limit issues, inconsistencies with original sources, and duplications
	Drinking Water Program Conceptual Models Database (DWP)	Some inconsistencies with original sources
Other Sources		
	US Fish and Wildlife Services and UC Davis Nutrient Study	No errors found